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JANUARY, 1918

HYDRO ELECTRIC POWER COMMISSION OF ONTARIO

The BULLETIN

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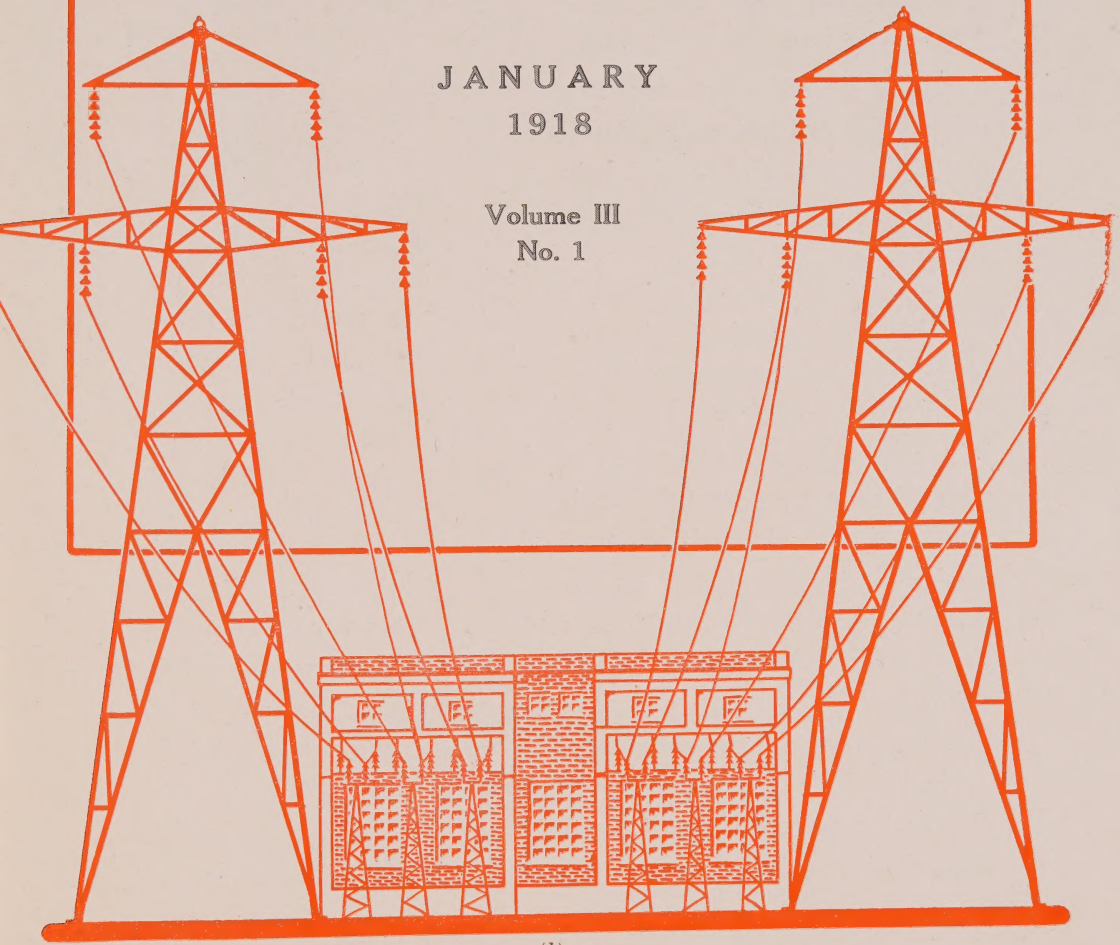

JANUARY
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Volume III
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EDITORIAL

Our Responsibility

THIS, the start of the New Year, is a time for reviewing our past efforts and a time for defining our aims for the future.

We are still at war. More Canadians will go forward overseas, continuing to fulfill our obligations and to maintain our already brilliant record in France.

With the passing of each month, with each new development in the conduct of the war, it becomes more and more apparent that economical, efficient administration of essential business at home is fully as important, is fully as vital, as is the work of fighting units abroad.

Every Canadian leaving our shores leaves a duty to be assumed by some one. As more men are withdrawn from the country a greater responsibility is placed upon those who stay behind.

We of the Hydro-Electric Power Commission of Ontario are engaged in a project of direct importance in Ontario's participation in the War. We are dealing in an energy which is the very life-blood of many industries. The present power situation serves only to emphasize the sound policy which aims to bring under the control of the people a resource so vital to industry—serves only to emphasize more clearly our responsibility.

Our duty, our opportunity, is clear. We must work harder and better at the task at hand, conscious that we are doing our duty in playing our part at a time when the full usefulness of every individual is essential.

Feeder Diversity of Electric Ranges

By H. B. Pierce

The effect that a load of electric ranges has on a given lighting feeder is a question of growing importance in the West where electric cooking is receiving such pronounced attention. Here are the results of an investigation on this subject by the assistant commercial agent of the Washington Water Power Company, at Spokane, that should prove of timely value to commercial agents throughout the West. The article was prepared for the Spokane Convention of the Northwest Electric Light and Power Association.—The Editors.

IN previous discussions of the electric range and its diversity, attention has been principally directed to the diversity or demand factor of a group of ranges with respect to its relation to the income of the central station at the main bus bars.

It will be the purpose of this paper to pay more particular attention to the effect a load of electric ranges has on a given lighting feeder; this is, for the larger cities, the more important question to-day, particularly so as, in these parts of the country, where hydraulic power is available, it is the primary duty of the engineer to keep down plant investment and as it will be some time before our range peaks cause us to experience station peaks requiring additional investment in generator capacity, it will be more profitable to consider first the problem that immediately confronts us, of having to either provide for heavier feeders or for a larger number of feeders, to handle certain sections where the electric range is threatening to establish the peak of the feeder.

In connection with any such discussion, it will not be out of place to point out what can be done to make the individual feeders more efficient.

To observe the effect of electric ranges on feeders in Spokane, a set

of six feeders was selected for special observation. As the city is geographically divided into two sections, north and south, three were selected for each. These were not selected at random, but were taken as follows:

1st.—One heavily loaded with ranges without other distributing power load. 2d.—One of medium range density, without other abnormal condition. 3d.—A feeder as nearly free from ranges or other power load as could be found.

By installing Bristol ammeters and watthour meters on each feeder, it was thought data of interest could be secured.

The first set of observations was taken in the middle of winter to determine, if possible, to what extent, seasons influenced such load factors. A similar set of readings was again taken in summer to supplement the first set. The results are shown in Table No. 1 and Table No. 2.

Table No. 1

Feeder Number	2543	2527	2146	2140	2147	2531
Location	Brown's Addition	Cannon Hill	Sacred Heart	Natatorium Park	Corbin Park	Gonnzaga College
No. of Ranges	13	39	13	21	11	6
KW. HR. 1st week	12,300	10,800	11,200	11,600	14,800	4,080
KW. HR. 2nd week	11,700	10,850	11,200	11,200	12,400	4,640
Total KW. HR	24,000	21,650	22,400	22,800	27,200	8,720
LOAD FACTOR:						
First Week	41.6	36.9	35.8	38.2	40.1	36.6
Second Week	39.5	37.2	37.0	36.6	37.9	40.4
For two Weeks	40.6	37.1	35.8	38.5	36.8	37.9

Table No. 2

Feeder Number	2543	2527	2146	2140	2147	2531
Location	Brown's Addition	Cannon Hill	Sacred Heart	Natatorium Park	Corbin Park	Gonnzaga College
No. of Ranges	13	53	17	25	17	6
KW. HR. 1st week	5,440	8,300	7,600	9,200	6,000	2,560
KW. HR. 2nd week	6,640	9,000	7,600	9,600	6,000	2,560
Total KW. HR	12,080	17,300	15,200	18,800	12,000	5,120
LOAD FACTOR:						
First Week	36.3	45.4	34.1	27.8	30.7	28.3
Second Week	30.2	42.5	39.7	28.5	33.2	28.3
For two Weeks	33.4	43.7	34.1	27.9	30.7	28.3

All of these feeders supply residential districts, with practically no stores or shops to be considered. Each feeder is laid out to handle approximately 100 amperes at 2,300 volts, single phase. Many, for geographical reasons, have maximum peaks short of this, but this is the amount of peak originally contemplated.

The kilowatt-hours observed are open to question as the instruments were rather large for the purpose, so that too much must not be assumed from the load factors given at the bottom of each column.

It will also be noted that no attempt is made to measure the range demand factor or diversity; this

would have been well-nigh impossible and as the effect of ranges on load factor is what is most interesting, computation of diversity is to a certain extent unnecessary.

The term "load factor" should probably be qualified in this case, as the maximum demands from which the load factors are computed are measured in kilo-volt-amperes and power factor arbitrarily assumed at 90 per cent. But as all of the feeders have approximately equal power factors, and as these results are not to be considered as highly accurate, the load factors given are sufficiently definite for comparison.

It will be noted that feeders with a small number of ranges show decreasing load factors as summer approaches, while the feeders with a large number of ranges show increasing load factors. One exception would appear to be feeder No. 2140, but as this feeder has an amusement park on it during the summer months, and was considerably altered in the spring, it is not typical.

In order to give more accurate information on the feeders with considerable range load, feeder No. 2527 was further analyzed by being equipped with more accurate recording ammeter and by rectifying the Bristol ammeter charts; on these rectified charts the average daily load has been measured by planimeter and laid off for comparison. (See Figs. 1, 2, 3, 4, 5, 6, and 7). The characteristics of the feeder are as given here:

Feeder No. 2527.—This feeder supplies a quarter of town located in the southern part of Spokane and made up of small frame houses of an average size of eight or nine rooms, with a few large houses and one apartment house, the latter with its eight 6-room apartments, each with electric range, being the largest single consumer on the feeder. The homes are mostly occupied by families of the better grade of office and professional men, the average income probably being about $2,400 per year.

Residence Data

Total number of residences	643
Total number of electric ranges	53
Total capacity connected in ranges	303.3 K.W.
Total number of electric water heaters	29
Total capacity, electric water heaters	21.65 K.W.
Total number of transformers	44
Total capacity, transformers	437.5 K.V.A.

Daily Load Data	Average K.V.A.	Maximum K.V.A.
Sunday	59.0	109.7
Monday	62.2	91.7
Tuesday	69.3	107.0
Wednesday	68.4	107.5
Thursday	61.8	97.3
Friday	63.7	111.2
Saturday	66.3	112.0
Average	64.4	
Weekly apparent load factor	57.5 per cent	

It will be noted that it is characteristic of these curves that there is a night load of something over 40 KVA. on every night and that the valley between the 6 o'clock peak and the 9 o'clock peak approaches the same minimum. This can be accounted for by the water heater load which is practically entirely cut off the range peaks, as each water heater is on a control switch that prevents its being used when the oven of the range is alive. This water heater load, therefore, accounts for over half of the 40 KVA., the balance is made up of all-night lighting and feeder losses, transformer iron losses and meter losses.

Deducting this 20 KVA. with an additional KVA. for lighting from the largest range peak, 107.5 KVA., we get a net range peak of 67.5 KVA. at 6.00 p.m., Wednesday, which, compared with the connected load of 303.2 KVA. in range capacity, gives a demand factor of 4.5, checking with the results formerly secured by the author (see A.I.E.E. Proceedings, August, 1916, page 1213), which would indicate that with 53 ranges, the poorest demand factor probably would be 4.2.

Now to consider the effect of our feeders in the near future: It is estimated that in a very few years the territory now fed by this one feeder will have six times the present range density, that is, 318 ranges with 1,820 KVA. connected. Should this be handled by six distinct feeders at present capacity, it is clear that the characteristics of the feeders would be quite similar to those of the feeder now supplying the territory, with the exception that the lighting and ironing peaks would be about 1.6 as large as at present. The annual peak would occur in winter, when the range peak and lighting peak coincide.

The winter peak for this feeder was 193.2 KVA. with 39 electric ranges, which with 3.9 demand factor (see A.I.E.E. Proceedings, August, 1916), would mean a maximum range load of 60 KVA., leaving 133.2 KVA. for lighting and losses.

Taking one-sixth of this, there will be little improvement in diversity of lighting due to increase in number of consumers. We get a lighting and loss load of 22.2 KVA. and a superimposed peak of 67.5 KVA. due to ranges, giving a total of only 89.7 KVA. for the annual maximum demand of the feeder, less than half its capacity.

Taking one-third of the district to a feeder, we would have a lighting and losses load of 44.4 KVA. which, with a load of 106 ranges of 607 KVA. capacity and demand factor 4.7, would be increased by 129.1 KVA. to a load of 173.5 KVA., which is within the capacity of the feeder.

If we go a step further and use only one additional feeder, we find that our lighting and losses load becomes 66.6 KVA. and our 159 ranges, with 910 KVA. of capacity and demand factor of 5.2 gives a total peak of 241.6 KVA. which a feeder of slightly larger size and only slight additional expense could handle.

It would appear in so far as feeders are concerned, the excellent diversity of the electric range will make it possible to handle very considerable loads with only slight increases in feeder investment.

Electric Fans for Winter Use

By F. F. Espenschied

TO many people the use of an electric fan in the home during the cold months of the year appears ridiculous, and in our climate the use of fans even in summer is relatively unimportant due to the limited period of extreme heat.

Experience has shown, however, that the ordinary portable fan should be used in this climate more days, and over longer periods during the heating season than during the warmer months of the year. We refer to the use of the fan as an auxiliary to the usual steam or hot water radiator.

The so-called coil radiator heats a room by "convection," that is, by heating the air immediately about it, causing the warm air to rise up along the walls, cross the ceiling and return when cooled to the base along the floor. The hot water radiator, with its relatively large surface and low temperature moves a large volume of air at a slow rate—the hotter the radiator the more rapid the air circulation. The man who smokes can easily demonstrate this air circulation in a closed room.

The radiator is used for the purpose, not of staying hot, but for the purpose of giving up the heat contained in the hot water or steam, to the air in the room. The more rapidly the heat is removed from the radiator by the air, the more rapidly the steam or water circulates, and here is one of the chief points in heating efficiency.

Tests have demonstrated that rapid water circulation in a boiler is necessary to high efficiency—furnace gases must sweep over the furnace interior rapidly, water must travel rapidly and freely over the interior of the water container to obtain the greatest efficiency. The same reasoning applies to the radiator—rapid air circulation is necessary to remove the already heated film of air from the coil surfaces. The capacity of a given coil to heat a given room depends largely on the rapidity of air circulation. Many heating systems are found too small during severe weather—due to insufficient surface with normal circulation, and it is in such cases and at such times that an artificial speeding up of the air circulation is most necessary.

The results to those who have not tried it, of forcing a draft of air against and up through even a warm radiator in a cool room will be found surprising. Air circulation is speeded up, water circulation likewise, the radiator gives up its heat quicker and the air in the room is better mixed and at a more uniform temperature throughout.

The best place to stand a fan for this purpose is on the floor a few feet from the base of the radiator and directed slightly upward toward the coils to assist the natural air circulation. By a little experimenting the best distance and direction can be found, but it should be remem-

bered that a reasonably high air velocity well distributed over the coil surface, with low or medium speed of the fan, is better than a strong draft through the coils at one place.

Hot air furnaces do not so readily lend themselves to portable fan assistance. Such furnaces can, however, be made much more satisfactory by installing a permanent fan in the air intake box so as to create a slight air pressure at the room registers. This will enable rooms to be heated even on the normally "cold" side of the house if the various registers are properly regulated. A portable fan placed before a register so as to assist in drawing the air *out of* the register and into the room is sometimes useful.

It might be argued that this winter fan load is not worth considering, but while the individual current consumption is small it can be made large in the aggregate, and usually it is a load off the lighting peak. It is entirely possible during some months of winter to have the individual fan K.W.H. exceed the ironing K.W.H. and at better load factor.

The saving in fuel and greater comfort in the home will frequently remove an apparent need for an enlarged heating system—a fan or two can be made of surprising use in helping the householder over the winter heating "peak" and with actual dollars saved.

It is the writer's belief that this use of the portable electric fan can and should be worked up to very large proportions during this season. The fact must, however, be brought prominently to the attention of the housewives, by proper literature and by well-planned demonstrations. Fan sales should be as high or higher during the Fall than at any other time of year in this province.

Electric Heating in Port Hope

By V. B. Coleman

Local Manager, Hydro-Electric Power Commission of Ontario

THE Port Hope sub-station building is after the plans of most of the Central Ontario sub-stations, being of brick, with 13-inch walls, a reinforced concrete roof and concrete floor.

There are five windows, 4 by 7 feet, or a total window area of 140 square feet, also a pair of double doors on the north, 12 feet 6 inches by 8 feet 6 inches, or a total area of 106 square feet. A basement is under practically the whole structure. My only reason for mentioning this is that the furnace which formerly heated the building is located there, and a more important fact that a stairway, which is not closed, leads from the basement to the main room of the sub-station.

The main room is 18 feet high by 30 feet by 38 feet, with a total size

of 20,500 cubic feet, which is now warmed with two 10 K.W. heaters and in the coldest weather the operators are comfortable in their shirt sleeves, but as there was no thermometer I cannot state the temperature. In ordinary winter weather, one heater is used and in colder weather the different heat switches are used on the second heater.

I might mention that this is a particularly exposed building, the room being 18 feet high, with unfinished brick walls, large doors with a north exposure, and 24 tubes with 1¼-inch holes through the wall near the ceiling, with no wires at all in nine of these, and the wire varying in size from No. 6 to No. 2 in the others. There should be taken into account the 750 KVA. transformer which is maintained at the temperature of about 38 degrees centigrade, and which helps in no small measure to add to the warmth of the building.

With the coal furnace, which formerly heated the building, in cold or stormy weather the men had to go around with their overcoats on and until last winter there was another 750 KVA. transformer which was used alternately with the present one.

SECOND-HAND METERS

The Commission will be glad to hear immediately from all Hydro towns having meters for disposal. We should like to have a complete description of the meters you have, giving the name-plate ratings on them and supplementing this information with as many details as possible as to the age of the meters and their present condition.

Offers will be submitted to you for these meters, based upon the facts that develop in each case, or the meters can be sent to our Laboratory for appraisal and the adjustment can be made after their condition has been ascertained.

We are particularly desirous of obtaining 10-ampere, 2-wire, single-phase, 60-cycle meters, but shall be interested in hearing about meters of any other ratings and frequencies.

HYDRO-ELECTRIC POWER COMMISSION
OF ONTARIO

Conducted by F. F. Espenschied

Iron Wire Transmission for Rural Extensions

L. P. PERRY, general manager of the Central Connecticut Power and Light Company, East Hampton, Connecticut, publishes an article under the above heading in the *Electrical World* for October 13, and since the subject is of considerable interest in this province during the present time, we draw from this article some interesting data. It seems that in Connecticut, there is a state law which compels a company to secure the approval of the state Public Service Commission before iron wire can be used. Permission has been secured for certain 2,200-volt extensions.

The company has in operation a three-year-old iron wire line which has stood up successfully and is built on 35-foot poles with two-pin cross arms and two No. 4 double galvanized B.B. iron wires. The cost of this line, including substantial payments for purchase and cutting of right-of-way and a small charge against engineering, was $517 per mile.

The state commission apparently was of the opinion that while there is no question as to the strength of galvanized iron wire, when first installed, there is a liability of its rusting, but the company held that iron wire can rust considerably before its cross-section is reduced to the point where it would be considerably weakened. They point out that if small telephone wire is safe for ten or twenty years, the larger wires, proposed for transmission purposes will, of course, have a longer life. In granting permission for the use of iron wire, the Commission demanded that the operating company use

extra vigilance during the semi-annual line examinations.

The article contains several curves and tables, which are the result of study made by the company to ascertain the most economical pole spacing for the iron wire line. With a given clearance of 18 feet from the lowest point of the conductor to the ground and using No. 4 bare conductors, it appears that seventeen 35-foot poles are required per mile, whereas twenty-two 30-foot poles must be used in the same distance. The data also shows that the 35-foot poles cost $167 per mile, while the 30-foot poles cost $178 per mile, making the cost of poles for 18-foot clearance, 6 per cent. cheaper than with the 30-foot poles.

With No. 6 bare conductors relatively larger sags would be required to keep the tension within safe limits. It was assumed that when this study was first undertaken the most inexpensive line would be built, with the shortest poles, but reference to the data submitted shows that with an 18-foot clearance the 25-foot pole line of 33 per mile, costs considerably more than a 35-foot pole line with seventeen per mile. At the then existing cost of materials, it is, therefore, evident that it is not more expensive to use No. 4 conductors with longer spans than to use a small conductor with shorter poles.

The article concludes with a list of conditions under which the Connecticut Commission approve the use of iron wire for rural extension, as follows:

1.—Provides that at the regular semi-annual inspections required by the rules of the Commission, special attention shall be given to the inspection of any lines of iron wire constructed under the provisions of this approval in order to detect and correct deterioration.

2.—Provides the specific lines on which iron wire is approved and states that this approval shall not be construed to cover normal voltage in excess of 4,400 volts, except upon a certain line at 13,200 volts which is extended to a quarry.

3.—The length of span between poles shall not exceed in any case, 125 feet.

4.—The approval is not to be construed as authorizing the use of any iron wire for poles used jointly with any other company or upon poles to which are attached other wires of petitioner.

5.—The approval is given only for construction that shall be completed in the year 1917.

6.—The approval is not to be construed as authorizing the construction of the line of poles by petitioner in any highway where there are already existing two or more pole lines carrying wires.

7.—This provides that the details of construction of the lines specified shall be in accordance with the June 2, 1911, report of the N. E. L. A., except to the extent of the details herein specifically approved may be inconsistent therewith.

Use of Dynamite in Digging Pole Holes

THE increasing shortage of labor, combined with increased loads on electric light and power systems that require new line construction, makes it advisable to utilize every possible labor saving method in building overhead lines. The digging of the holes for pole lines is always a laborious job and has been met to a certain extent by use of machine drilling outfits mounted on motor trucks. Such equipments are expensive, however, and it is worth while considering other means where an initial heavy expenditure cannot be incurred.

In a recent issue of the *Telephone Engineer,* J. B. Stoneking describes the use of explosives as a substitute for digging in various sorts of soil. His attention was first called to the practicability of the dynamite method of hole digging by an old miner on some telephone line construction in Montana, where the men were paid a certain sum per hole. The soil was a clay loam slightly moist, but firm enough to require barring in digging the material. A bar was driven thirty inches (30 inches) into the ground to make a hole for the dynamite, from ¼ to ½-pound of which was used per pole, generally without tamping, but in some cases in more compact material a short plug of wet clay was used. A bridge of earth was left over the cavity formed by the explosion, but a few blows with a shovel caved this in, and the debris was removed from the bottom. A good hole from 10 to 14 inches in diameter and from 3 to 3½ feet deep, when cleaned, was obtained, the sides and bottom being well compacted. The miner was enabled by this means to complete nearly twice as many holes per day as any other man in the digging crew.

Later trials in different soils have shown that what is a good loading practice for one condition does not always hold true for others, and it is necessary to shoot a few holes in order to arrive at a correct loading.

Better results have been obtained by removing the top earth to a depth of several inches and to the diameter of the pole hole desired before making the bore hole for the dynamite. This has the effect of relieving the pressure and diminishing the formation of the bridge over the cavity. In making the holes for the dynamite a punch bar driven by hammers, an earth auger with a long handle, or a churn drill is generally used, although a large telephone company uses a specially made hollow pipe which is churned up and down, doing very effective work in the soil, enough water being used to make a thin mud.

For deeper work, up to 6½ feet, very good holes are made by tying small pieces of from one-eights to one-half cartridge to a small straight lath or stick, starting at the bottom end and spacing them about 6 to 12 inches apart, leaving the last piece about 18 to 24 inches below the top of the ground. This distributes the

charge along the entire hole and packs the earth tightly against the sides, leaving a cavity from 12 to 18 inches in diameter. Sometimes the dynamite is inserted into a long roll or cylinder of heavy stiff paper, and held in place by sticking pins through it, or by cutting short sticks the length it is desired to space the cartridges. Care should always be taken not to allow earth to fall into and close the hole between the cartridges, for this has a tendency to break the detonating wave from one cartridge to another and may result in micfires.

Ordinarily no tamping is necessary, but for harder material a small amount of tamping has the effect of confining the gases formed in the explosion and forcing them to do more work laterally. Tamping generally leaves a bridge over the cavity. By varying the size of the cartridges, the spacing apart along the hole, and the mount of tamping, in a few trial holes the engineer is able to obtain a system of loading to fit almost any conditions.

Due to the wide adaptability and elasticity of this method of digging holes, the quickness, absence of high first cost for equipment and overhead charges for maintenance, and low cost per hole as compared to hand labor, it has met with much favor from engineers and contractors who have given it a thorough trial.—Extract from the *Electrical Review,* August 25, 1917.

Showing the Public "How It Works"

"It is easy to take too much for granted in respect to the public's electric information," said a traveling man the other day. "Recently I noticed in a large electric shop one of those motor-driven machines which can be attached to various hand-operated kitchen utensils to transform them into electric labor savers. This portable motor outfit stood by itself without even a descriptive folder near it.

"Just then two ladies entered the shop. One of them noticed the kitchen motor and inquired of her companion regarding its use.

"'I don't know what it is or what it does,' was the reply, 'but I'm not going to display my ignorance by asking a salesman.'

"It would not have been difficult to connect the machine to an egg-beater, and mount a card near it telling of other helpful things the outfit can do in the kitchen. The visitor who hesitated to 'display her ignorance' has much company, and it is up to us as electrical business men to meet her more than halfway in showing what our goods are, what they will do and how they do it. There never were better rewards for the exercise of constructive salesmanship than the conditions of to-day offer."—*Electrical Merchandising.*

Delinquent Accounts

By R. C. McCollum

SOME months ago in order to secure definite information as to the seriousness of the delinquent account problem, the following circular letter was sent out to a number of municipalities:

"In order that we may obtain some data regarding the difficulties experienced by municipalities in collecting accounts, will you kindly answer the following questions based on your records or personal observations:

(1) Is the discount rule impartially and generally enforced?

(2) About what percentage in number of your customers fail to pay in time to secure their discount each month?

(3) About what percentage in number of the delinquents are still in arrears when the next bill is sent out?

(4) About what percentage of consumers are disconnected each month on account of arrears?

(5) When service is disconnected on account of arrears, do you make a service charge for re-connecting?

(6) Have you disconnected the same customer for arrears more than once?

(7) About what percentage of the total number of accounts on your cards show arrears of over two months' bills?

(8) About what percentage of your total revenue is lost each year through bad accounts in each revenue account — Domestic Light — Commercial Light—Power?

(9) In your experience just how much of a problem is delinquent accounts; what is your method of handling them and do you recommend any action other than that set forth in the Standard Interpretation of Rates?"

The readers of THE BULLETIN will be interested in the fourteen answers which have been received, and which have been for lack of space tabulated so far as questions No. 1 to No. 7 are concerned, and the answer to question No. 8, with the final comments quoted in full:

Q. 1.—Nine answered yes—two allow one lapse to each new customer—one allows one extra day and one recognizes valid reasons for delay.

Q. 2.—Two municipalities reported 4 per cent., five 5 per cent., one 6 per cent., one 8 per cent., one 10 per cent., one 15 per cent., and one 22 per cent. The three last are competitive territory, one of which reports the collection of discount penalties each month amounting to 1.4 per cent. of the net revenue.

Q. 3.—The answers to this question are difficult to tabulate, but indicate that about 75 per cent. of those who lose their discount are still in arrears at the end of the month, it being obvious that under the rules there is no special reason why a customer having lost the discount should make any special effort to pay before the receipt of the following months' bill.

Q. 4.—The answers indicate disconnections for failure to pay, aver-

age about one customer per 1,000 each year, which if reduced to a monthly basis would give a number too small to be intelligently stated in percentage.

Q. 5.—Seven municipalities make a charge of $1 before re-connecting a customer, and one of them in addition collects a deposit of $3 as a guarantee for future bills. In four municipalities no charge is made, and in three the question has never been raised as no connections have been cut.

Q. 6.—Five municipalities report having cut the service to the same consumer more than once—the balance reporting that this has never been necessary.

Q. 7.—Five municipalities report less than 1 per cent.; five report about 2 per cent.; four others estimating the number at from 3 to 7 per cent.

Answers

"By enforcing the Standard Interpretation of Rates and a system of notices both to the owner and tenant, after each collection, we have no trouble with our accounts. In a few cases we have handed arrears to the town clerk to collect for us with the taxes and this plan is working out entirely satisfactorily."

C. W. SCHIEDEL,
Secretary-Treasurer and Manager,
Waterloo Water & Light Commission

"Taking domestic lighting, commercial lighting and power together for the year 1916, our losses were not more than one-tenth of one per cent. We estimate that $100 would easily cover all losses in the electric department last year. In fact, our commissioners wrote nothing off for bad accounts. Perhaps last year was better than the previous years, but we have never lost more than $200 or $300 in one season's operations.

"We find that the only solution to this problem is to keep everlastingly notifying consumers in arrears. We have a system of collection notices, in the first of which we notify consumers they have not made payment for the previous month. If in arrears for two months, we ask for payment before next discount date expires, and if longer we advise them we cannot longer give service unless payment is made by a specified time. As a last resort we give notice of disconnection within two or three days unless payment is received."

G. H. CLARKE, Secretary,
The Kitchener Light Commissioners

"We do not find it necessary to disconnect any customers for arrears. Three years ago we disconnected four or five commercial services who were two months in arrears and who were constantly neglecting to pay their bills, and we have had no trouble with them since. We allow no customer to go over two months in arrears."

E. J. STAPLETON, Secretary,
The Collingwood Water and Light Commission.

"Practically nothing lost. Not over 1/40 of 1 per cent. Where tenants default, accounts are sent to the landlord. Collecting of accounts not difficult when handled promptly or by seeing the party personally."

F. A. EARLY, Secretary,
Brampton Hydro Commission.

"Domestic light, 1.3 per cent.; commercial, .9 per cent.; power, .04 per cent. The secret of collecting accounts is apparently eternal vigilance and necessitates keeping constantly after the delinquents till the account is settled."

O. M. Perry, Manager,
Windsor Hydro-Electric System.

"Domestic light, one-quarter of one per cent. Commercial light, nil. Power, nil. Delinquent accounts do not give us very much concern as a rule. About one per cent. of our customers give us trouble and these bad pays are invariably the same ones. We use a system of white and pink notification of arrears. The white slip is used whenever an account has arrears that have been standing for two or three months, depending on the consumer, but after three months, in most cases we attach a pink slip. We keep a record of these arrears in the form of red and white colored steel signals, which we slip on to the customer's record card. On the day following the last discount day we send out and shut off the light or water wherever we find a red signal remaining. These signals are removed as the accounts are paid and checked off. We have our water accounts on cards the same size as the electric consumers' records and both departments are run in the same way.

E. G. Heise,
Secretary-Treasurer,
The Preston Light and Water Commission.

"Domestic and commercial light, about one-quarter of one per cent. Nothing lost on power during the past two years.

"Up to the present we have not found the problem of delinquent accounts a serious one. We find that a final notice, which states that at the expiration of so many days the service will be discontinued is sufficient to effect a settlement. In some cases we insist on a deposit, sufficient to cover about two months' bills, and this has saved us considerable trouble, and think this is the best method of dealing with those whom you know to be slow pay."

A. B. Scott, Secretary,
Galt Hydro-electric Commission.

"About two-thirds of 1 per cent. for domestic light, one-quarter of 1 per cent. for commercial light; one-tenth of 1 per cent. for power.

"In our judgment we think that the present Standard Interpretation of Rates, and the Local Rules and Regulations, cannot be improved on very much, excepting in municipalities having competition. We would also suggest, in fact, urge that a more systematic manner be adopted by the municipalities using H.-E. power by keeping a black list of customers who are dead beats and move from town to town; this to our minds would certainly help out a whole lot in lost revenues through bad accounts."

John J. Heeg, Secretary,
Board of Light and Heat Commissioners.

"We provide in our accounts for bad debts of 1 per cent.

"The present method which we adopt in the handling of our custo-

mers is as follows, and the results we are obtaining appear to be, generally speaking, satisfactory:

Consumers one month in arrears: On the rendition of the current month's bill a sticker is attached thereto, drawing attention to the fact that settlement has not been received for the previous month's account.

Consumers two months in arrears: Three days after the expiry of due date on current bill a final notice of arrears is forwarded advising consumer that failing to receive settlement to cover within three days, service will be discontinued. If the account is still unpaid at the expiry of the three days a Temporary Cut-off Order is issued and given to the collector with instructions to collect all money owing or seal the meter. In case a meter is sealed and the account still unpaid at the end of one further month, Meter Removal Order is issued and meter removed.

In instances where collectors are refused admission or cannot gain access to premises, the service is cut at the pole.

"Of course, as you will realize, methods suitable in certain districts are not suitable in others, and among other things to be considered is the question of the nature of the competition.

H. H. Couzens,
General Manager,
Toronto Hydro-Electric System.

"Domestic, 2/9 of 1 per cent.
"Commercial, 1/3 of 1 per cent.
"Power, 1/13 of 1 per cent.
"Average, 1/5 of 1 per cent.

"About 5 per cent. of consumers are in arrears at the expiry of ten days allowed for discount on second account rendered at which time collector is sent for collection of account; if the same is not paid, notice is mailed that payment must be made within 24 hours or service will be disconnected. As a matter of recommendation we feel that it would be better if all "house" lighting accounts up to $5 and other small accounts less than $1 be subject to a discount of at least 20 per cent., and especially all house accounts less than $1."

T. E. Metcalfe, Secretary,
Hamilton Hydro-Electric Commission.

"The percentage of loss of the total revenue would be for domestic light, 2/5 of 1 per cent.; commercial, ½ of 1 per cent., and power ¼ of 1 per cent. We have one clerk who devotes a great portion of his time to collections. He endeavors primarily to discourage the habit of missing the first month's discount. Shortly after the date of expiry for payment of the account, he goes through the cards and sends out a form letter No. 1, courteously reminding the consumers that they have overlooked payment and thereby forfeited 10 per cent. The form letter contains this sentence—"As you are the loser to the extent of 10 per cent. prompt payment discount, allowed off the monthly consumption, we believe you will appreciate our reminder and co-operate with us in our effort to avoid the accumulation of arrears whenever possible." In the majority of cases this has the desired effect of bringing in pay-

ment of arrears with the following month's account; should it fail to do so, a second form letter is sent out, drawing attention to the still existing arrears, and also to the clause in their contract which authorizes the department to discontinue the service in case they fail to pay. This is followed up by a third notice within a reasonable length of time intimating that if the claim is not settled within a given period it will necessitate the discontinuance of service, and a final letter naming a specific date when the service will be discontinued unless the arrears are paid. In a great majority of cases this latter form has the desired effect. We find it necessary in a number of cases for our collector to make a personal call, which perhaps is the most effective way of bringing about settlement.

E. H. Caughell, Manager,
Hydro-Electric Commission of
St. Thomas.

"Domestic light, 1916, in the neighborhood of $12 or $13, caused by a few families moving to the United States.

"Commercial light, none.

"Power, none.

"We have been very fortunate in regard to our accounts, owing largely, we think, to the fact that our customers own their homes. When one does get behind and becomes careless we write them and to date it has usually brought about the desired result. We have had only one case of suing in the Division Court, when we obtained judgment. We are of the opinion that the Standard Interpretation of Rates covers the situation nicely. Our experience has taught us that it is the same customers who usually get in arrears.

A. B. Lee, Sec.-Treas.,
Woodstock Water & Light System.

Window Feature in Transparent Mirror

The transparent, or "trick" mirror can be used effectively as the central feature of an after-dark display. An electrical dealer who was offering a special sale of toasters used as the centre of his trim a transparent mirror behind which a toaster was placed. By means of a small flasher he turned off his window lights at intervals of thirty seconds, at the same time turning on the lights behind the mirror. This made the mirror frame and toaster the only articles plainly visible and concentrated attention upon the item the dealer wished to feature. When the main window lights were again turned on, the display showed how the toaster could be used. The effect of action gained by the change of lights in the window arrested the attention of everyone passing by and the effectiveness of the display did the rest. Care should be taken that the flashes are not too rapid: at least thirty seconds should be allowed between each light change.—*Electrical Merchandising.*

Relations Between a Utilities Department and the Public

By E. V. Buchanan

General Manager, Public Utilities Commission, London, Ont.

THE ideal toward which a municipal department should constantly work should include the highest standards of service on the part of every officer and employee that it is possible to obtain, much criticism in the past having been hurled at municipal departments because it has been found that "soft jobs" were being found for persons absolutely unfitted and unqualified for the work they were presumed to conduct. Any operating department of a municipality, be it water, light, power, or other utility, is open to this particular criticism and should be jealously guarded by the officers who are finally responsible to the public for the proper conduct of such departments.

A municipal water and light department has almost autocratic powers in conducting its affairs. Its way is smoothed in many respects by laws making sure the receipt of all charges billed against the water and light users. But these very benefits and privileges impose on such a department the necessity for just treatment, high grade management and earnest endeavor. We are paid for the service rendered a municipality, but the fact that it is a service of the public should bring with it to every person so engaged the thought of patriotic stewardship and the determination to give more than 100 per cent. service.

A highly important element of success in the relations under discussion is courtesy. No matter how thoroughly alive to business principles anyone may be, impolite demeanor in meeting customers must eventually drive all such away with a feeling of ill treatment and resentment, and it requires but a short

time to pass the news of such discourteous treatment along the line, with the ever increasing increment of exaggeration which mouth-to-mouth tales always gather. One person acting discourteously can do more to rouse criticism of a municipal administration than ten courteous persons can undo. Courtesy costs nothing but brings heavy returns on a small capital invesement.

Closely akin to the element of courtesy is affability. We might almost say that it is a part of courtesy. The telephone companies of the country advise us all to use "the voice with the smile," and there is good, hard sense in the advice. If the voice with a smile has been found by long experience to be of value in a large business, how much more the face with a smile should be able to accomplish.

"A soft answer turneth away wrath" comes to us from several thousand years ago, and few of us can give a soft answer without the accompaniment of a pleasant smile. In a town not far from New York one of the department officials having to meet the general public in large numbers has for years been spoken of as one of the most accomplished men in handling people who have grievances and who are determined to show the town that they don't intend to be stepped on and that the city employees will soon find out "who's boss," simply because he persistently and even aggressively smiles and keeps pleasant until the irate customer is forced to give way before that genial face, and in almost every case leaves with a smile on his own face. It is the intelligent use of "the smile that won't come off" that turns many an enemy into a friend of the business.

The last item on the personal side on which the author cares to touch is that of diplomacy. We may have authority to force a certain situation and accomplish our ends by this means, but to do so may produce bitterness on the part of the aggrieved customer. It might be all right from the legal standpoint to call a man a thief when we feel that we have proved that a meter has been tampered with deliberately, and yet such cases are so difficult of absolute proof that a quiet man-to-man talk with the suspected party probably produce admissions which could be obtained in no other way and lead to the adjustment of the case and full settlement of our money charges against the property, or make easy the prosecution of what might otherwise be a different case to prove in court.

It might be all right for us to tell a person that we were going to perform a certain function of our business because the law gives us the right to do it, and dismiss him with such a bald statement of the case, but by using a few words of explanation showing the necessity for carrying out this line of action in the way prescribed, and possibly including in such explanation the regret of the authorities that any one person should be inconvenienced, there will be no hard feeling left on the part of any fair-minded men, the act of the department will be accepted as a necessary one, and such inconvenience as may be involved will be more easily borne be-

cause of the fair attitude of the department official.

General knowledge of all department activities should be possessed by as many as possible of those connected with the department, in order that a customer requesting information shall not be passed from one to another seeking information. Those of us who are dealing with certain supply concerns in this country know how aggravating it is to call on the telephone, explain our wants, be referred to Mr. Smith, explain our needs in detail and be informed in dullest tones that Mr. Jones can tell us about these matters, and on referring to Mr. Jones again to explain our desires, be informed by Mr. Jones that Mr. Johnson is the proper person to give us the information. This may continue until our patience is worn to a frazzle and we get tired repeating the formula which expresses our wants.

The conclusion of the whole matter is that our work is the service of the public, and must not be measured by financial standards alone.

Domestic Electric Appliance Maintenance

By F. F. Espenschied

A GREAT deal of time and money are spent to increase the sale of household devices, and annual sales have reached very large proportions. It is true that such appliances have to-day a fairly long useful life and are designed for ruggedness and durability, but it is evident that sooner or later every article sold will need some repairs and often can be made to last many years longer by slight attention.

The central station is not so much interested in the first profit, if any, on the device sold, but is greatly interested in its long continued use in the hands of the householder. This phase of the appliance business apparently has not received the thought and care warranted by the importance of the subject, and these remarks are prepared in the hope that they may lead to a better appreciation of the needs of the householder.

When it is recalled that most domestic devices are used by women and that the average woman or man is not a mechanical or electrical genius, we can appreciate the annoyance and even the danger attendant upon a damaged piece of electrical equipment in the home . If the device is greatly needed it may be taken to some nearby repair man, a tinker or a handy friend, or even down to the place where it was bought. In other cases the owner simply places the damaged device on a shelf and soon forgets its existence. From data gathered by large companies it appears that there are a great many cases where devices have been discarded simply for lack of simple repairs and in one case we recall that a central station supplying a large territory put on a travelling repair crew which made a systematic canvass and census of all domestic appliances in each town

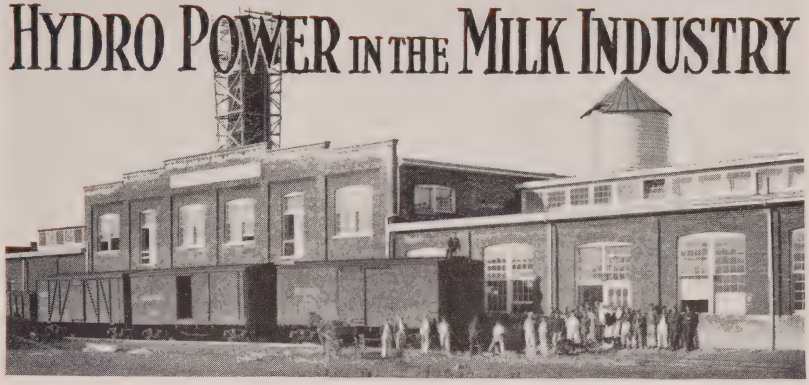
served. Repairs were made gratis and it was felt that the data gathered, the good will engendered, and the more consistent use of the devices, amply repaid the expense incurred.

There is also a personal and a fire hazard from damaged devices or repairs made carelessly, to say nothing of the actual money lost by customers who do not get full life out of expensive electrical devices. The writer believes that the subject of repairs is of sufficient importance to warrant a systematic plan of action, and one that can readily work in with increasing sales and better utilization of electrical equipment. Such a plan could be started by notifying each domestic customer that any of his domestic devices (perhaps excluding lighting fixtures and wiring if desired) will be repaired free of cost for labor only if brought to the office and called for by the owner. Repairs to larger devices to be made at cost for time and material where a special visit by a repair man is necessary. Supplement this work by a travelling repair and census man in the case of a large town or city, and in the case of a group of small towns by a district repair man or men, all travelling-men—repairs to be made free except for the actual cost of material used. These travelling men to make out detailed daily reports of all visits, repairs, material used, and particularly details as to all devices owned or used by the homes visited; condition of wiring, lamps, fixtures, complaints, etc. This latter information should be carefully transferred to a special customer's card file system, using the same service number as the billing system, and will be a useful source of information for the local managers. Details can be elaborated to suit local needs and conditions.

Data of this kind can be made of greatest use as sales leads and if used properly should assure a complete domestic electrical equipment in every home that can afford to buy devices, either for cash or on time payments.

Some such system would be a welcome, and in the end a paying addition to Hydro service, increasing its usefulness and popularity to a very great degree.

HYDRO POWER IN THE MILK INDUSTRY



By J. S. Parker

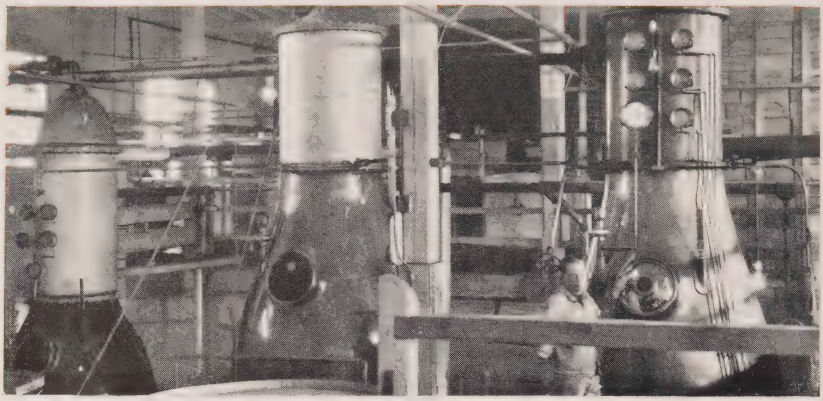
AMONG the many problems to be met by Canadian manufacturers, as a result of the European War, is that of placing at the disposal of the overseas forces an adequate supply of the milk products for which this Dmoinion is justly noted.

The Maple Leaf Condensed Milk Company, Ltd., whose plant is located at Chesterville, in the heart of a splendid agricultural and dairying section of eastern Ontario, is one of the front-line organizations connected with this industry. The factory, which began operation in the autumn of 1916, now has a capacity of 130,000 pounds of milk during each 10 hours, and extensive additions to the plant are contemplated in the near future. The farmers in the surrounding district are meeting the situation promptly and effectively, by extending their herds and installing milking machines and other power equipment.

The preservation of milk in its natural state is a problem which has occupied the attention of industrial chemists for many years. As early as 1810, an English patent was granted to De Heine, covering ('The Evaporation of Part of the Water from Milk and its Preservation with Cane Sugar." Other early English patents on condensed milk were granted to Newton, in 1835; Grimway, in 1847; De Lignac, in 1847, and, in France, to Appert, in 1827. The first patent for a vacuum pan for evaporating milk was granted to Green, in England, in 1813.

The object of these early inventors is clearly shown in Newton's patent, which reads:

> "For preparing milk so that it may be preserved for any length of time with its nutritive properties and capable of being transported into any climate for domestic and medicinal purposes,—this being effected by adding to



A partial view of the vacuum tanks

the milk a certain amount of sugar and evaporating it by any suitable means, using only a gentle heat to quicken the operation. It may be brought to the consistency of cream, honey or soft paste, or even into dry cakes. Cocoa, coffee or tea may be evaporated with it."

The first instance of the successful manufacture of condensed milk, on a commercial scale in America, was in 1856, by Gail Borden, founder of the present firm of Borden's, who, in that year, built a milk condensing factory at Wolcottville, Connecticut. Up to the year 1861, there was little demand for condensed milk, but, during the American Civil War, a great demand was created and, from that time on, it has steadily increased. During the present European War, the market has been increased to many times the former production.

In 1900, there were 4 condensed milk factories in Canada: 2 in Nova Scotia, 1 in Ontario and 1 in Prince Edward Island. The value of their products was $269,520.

I n1907, there were 7 of these factories—the three additional establishments being situated, one in Ontario and two in Quebec. Their products were valued at $910,842.

According to the last Canadian census, in 1910, there were at that time 11 factories, with a total production valued at $1,814,871. No definite figures are at present available, as to the present number of factories in the Dominion, but the following table, showing the exports of condensed milk for the last 7 years, will show the growth of the industry:

1911—	6,584,828 lbs.	Value....	$469,406
1912—	4,389,350 lbs.	Value....	305,678
1913—	335,849 lbs.	Value....	25,554
1914—	9,339,382 lbs.	Value....	666,941
1915—	18,355,975 lbs.	Value....	1,181,300
1916—	13,247,834 lbs.	Value....	770,566
1917—	15,858,622 lbs.	Value....	1,371,610

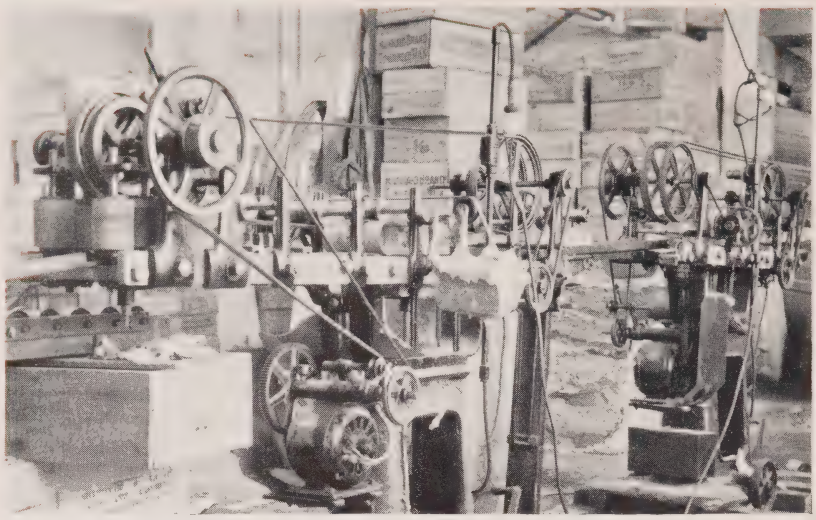
The milk supply for the condensing must be ample for the factory's capacity and must be of the highest quality. It is under the rigid inspection of the factory and con-

stant inspection is also conducted of the herds, pastures, barns and dairies. Immediately after milking, the milk is cooled, aerated and stored in a cool place until brought to the factory. A small sample is taken from each can, for test purposes, and the milk, after being weighed, is run through a filter into large receiving vats, where mechanical agitators keep the contents at an even temperature. The room in which these vats are located is kept as cool as possible and cooling by refrigeration is resorted to during hot weather. The cans brought in by the farmers are washed and sterilized by an automatic machine and returned to the patrons in the best condition for cleanliness and sanitation.

The fresh milk is drawn from the receiving vats into large copper receptacles known as "fore-warmers," by means of electrically-operated pumps. Here, after the addition of about 15 per cent. by weight of cane sugar, it is heated by a steam jacket to a temperature which varies with conditions and the seasons of the year, but an average condition would place it at about 130 degrees F. The variation in the temperature is directed towards overcoming crystallization in the finished product.

The milk is now drawn by atmospheric pressure into the large copper vacuum tanks (see Fig. 2) and the condensing operation begins. The concentration is carried out at a vacuum of about 28 inches—the tanks being heated by means of a steam jacket and also by internal

Three-phase motors on group drive



One-sixth h.p., single-phase motors driving labeling and wrapping machines

steam coils. An even temperature of about 140 degrees being thus maintained.

The "condensing" takes about two hours. Samples are drawn off at frequent intervals through a double-sealed test cup. The consistency is tested by means of hydrometers—the end-point being 35 to 36 degrees Beaume. As soon as the right consistency is obtained (this being when the contents have reached about one-third of their original volume) valves are opened and the finished product is run into shallow vats, where it is cooled by a jacket of cold water. Mechanical agitation is carried on during the cooling process, to insure a smooth product.

After cooling, the condensed milk is filled into cans and sealed—the heat of the sealing operation driving out practically all of the free air in the top of the can. The product will then keep in good condition for several years.

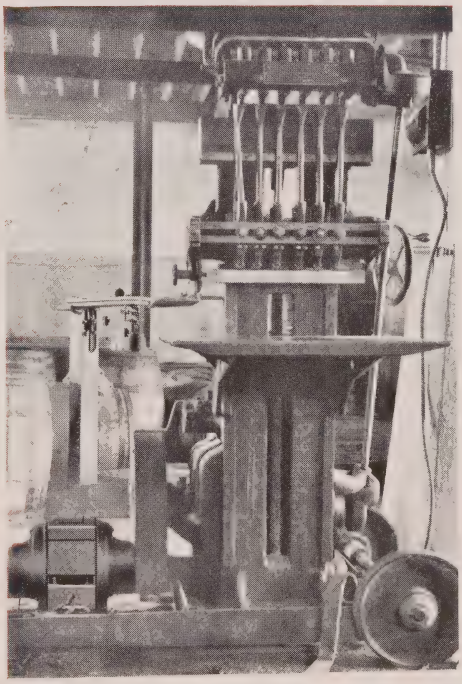
It is imperative, all through the process of manufacture, that the strictest cleanliness be observed. The engineers of the company, from their wide experience in similar plants in the United States, selected a combination of individual and group motor drives, as best suited to their needs. There are 16 motors at present installed, as follows:

1—25 h.p., three-phase, connected to Rand air compressor.
1—25 h.p., three-phase, connected to centrifugal pump.
1—25 h.p., three-phase, connected to refrigerator plant.
1—5 h.p., single-phase, connected to machine shop.
1—2 h.p., three-phase, connected to water pump.
1—5 h.p., three-phase, connected to churns and separators.

1—1 h.p., three-phase, connected to milk pumps.
1—5 h.p., three-phase, for the group drive for agitators.
1—3 h.p., three-phase, connected to miscellaneous group drive.
1—2 h.p., three-phase, connected to sealing machines.
1—5 h.p., three-phase, connected to can filler.
1—2 h.p., three-phase, connected to box nailer.
1—3 h.p., three-phase, connected to sugar elevator.
1—1 h.p., three-phase, connected to box elevator.
1—1/6 h.p., single-phase, connected to can labeller.
1—1/6 h.p., single-phase, connected to wrapping machine.

As an interruption of service, even for a few minutes at certain times in the operation, would cause great inconvenience and loss, the company has installed a steam-driven, direct-connected standby unit of 60 kilowatt capacity, which can be put into service at a moment's notice. As this is a 2,300 volt delta-connected machine, and the incoming Hydro-electric feeders are 4,000 volt "Y," two separate banks of transformers are used and the switching from the Hydro to the standby supply is accomplished by a three-pole, double-throw switch, on the 220-volt side.

The 25 h.p., three-phase motor, driving the centrifugal pump, is located on the river-bank, about 2,000 feet from the factory and is controlled by a compensator, located in the engine room. Power is delivered to the motor, over a single-circuit of No. 2 copper, carried on "Acme" racks on the town poles. This control, though somewhat unusual, has given the utmost satisfaction and a very considerable economy in the cost of water supply has been effected.



Two h.p., 3-phase motor driving a box-nailing machine

The great advantage of cleanliness, efficiency and flexibility, which can be effected by individual motor drive, have been realized by the company's engineers and the results have demonstrated, beyond doubt, that the additional expense incurred was fully warranted.

NEWS FROM THE FRONT

H.M.M.L., 248,
PORT SAID, EGYPT, October 8, 1917.

Dear Hydro:

As usual the censor stands in the way of my giving you any very interesting news of the doings out this way, so I will content myself by telling you that the work goes on about as usual. I am once again back on a regular routine after having my boat on the slip for a good overhaul and am out looking for the elusive Hun practically every day.

We had a little change in the monotony last Saturday when we rescued a schooner which had run ashore about 12 miles from here. She was in too shallow water for us to get near in the motor launch, so I went on board and after three hours' work succeeded in kedging her into deep water, when we took her in tow and brought her here. The old Arab captain looked on me as an angel from the skies and called down all the blessings of Allah on my head. The vessel was packed with pomegranates, so I took what I considered the value of his blessings in a sackful of fruit.

Outside of this we are pretty quiet here. My boat was on the slip six weeks altogether and during that time my brother and I managed to get away for a four days' visit to Cairo. We certainly enjoyed the trip immensely and meeting a chap in the Sudan customs who spoke Arabic and knows Cairo well, we went everywhere with him and did not have to bother engaging a dragoman, or guide, who would have wasted our time taking us to places we did not want to see.

One very interesting trip we made was down the Nile to the Barage, as it is called, where there is a 1½-mile dam across the Damietta and Rosetta branches of the Nile for the purpose of supplying water for irrigation all over lower Egypt.

The pyramids and sphinx we of course visited—and all that I can say after seeing them is that the ancient Egyptians must have been "some engineers." However, I cannot begin to describe all our impressions of the place, so it will have to stand for the present.

I have received the copies of THE BULLETIN and the copy of the Annual Report, all of which are most acceptable and for which many thanks. From all I hear, the Hydro is busier than ever and you are having a problem to take care of all the staff. If this keeps on you will be piled two-deep soon.

Sincerely yours,

WALTER O. BOSWELL.

LETTERS FROM READERS

WINNIPEG, MAN., Dec. 11, 1917.

The Editor, THE BULLETIN,
Hydro-Electric Power Commission of Ontario.

Toronto, Ont.:

Sir,

I was much interested by Mr. J. J. Heeg's letter appearing in your November issue, and in view of your intimation that discussion would be welcomed, I take the liberty of writing you.

Allow me to state first of all that it is regrettable that electrical inspectors in Canada have as yet no association similar to those existing in the United States—if we had, many of the problems that come before us could be discussed and some degree of uniformity of view arrived at. It should not be forgotten that the inspector's point of view is very often taken from a different angle from that of the central station engineer or superintendent, which may explain many divergent views expressed on a given problem.

Commenting on Mr. Heeg's various points as stated, let me say:

(1) I would view the proposed plan of using the metal of the conduit as a hazardous one, generally speaking, as its reliability would depend upon so many variable factors. These would include the purposeful grounding of the secondary distribution system; the character of the means used to attach the neutral conductor at either end of the pipe itself; the question as to the possibility of the conduit being within reach of persons standing on wet ground with danger of shock due to difference of potential between surface of ground—say in early spring—and a deep ground made below frost line; the method employed in connecting sections of conduit together—for instance, the interposition of a junction box with lock nuts would be very hazardous in such a circumstance. Looking at this from an all round standpoint, I would imagine it a very risky plan likely to lead to unsatisfactory service to the customer with possibilities of danger to life and property.

(2) After twenty years' experience of the problems met with in inspection work, I am of the opinion that it would be a mistake to cut down the gauge of steel for boxes. These fittings when installed during the roughing process are light enough now, and in fact, I believe we will yet go back to cast iron construction in certain cases in order to secure the necessary security; the weak point to-day in conduit work is the unsatisfactory connection between the conduit and the steel box.

(3) I can see no objection to this suggestion of an open work job or

in a knob and tube job, if such is allowed in your Province (in Winnipeg, however, we do not allow 500 volt wires to be concealed unless in complete conduit work), provided it can be demonstrated that the wiring contractor provides a workmanlike job in the construction of the cabinet, particularly in the lining — my experience is that unless these are built of kiln dried lumber at a factory they are a source of endless trouble to the inspector. My own ideas call for locking of the service cabinet or provision for doors with strong spring hinges. The weak point to-day in the ordinary cabinet is the prevailing habit of leaving the door wide open, thus nullifying 90 per cent. of the safety factor; in fact, we might as well have it out altogether unless we can deal with this "open door policy."

(4) Mr. Heeg must surely be suffering from the use of Old Code wires. Since we compelled the use of 30 per cent. Para wire, we have almost completely eliminated the trouble complained of. I suggest, however, it is necessary for the inspector to use a Megger test applying at least 500 volts, or better still, 1,000 volts, on all service entrance wiring in conduit. Unless this is done it might not check a wireman up who has made joints in a straight run of pipe.

(5) We have not as yet adopted the sealed service box, but will likely do so early next year, and it would certainly be necessary to my mind to seal each and every customer's feed even though the main service is locked, otherwise little relief from present intolerable conditions would be afforded.

(6) Our rules have for the last twelve years insisted upon nothing less than No. 10 B. & S. for the mains of any job, however small, fusing this at 25 amperes. We have found on ordinary small house loads that this has cut out a great deal of the blowing of main-line fuses that formerly caused considerable trouble. We are finding, however, that with the extending use of cooking and heating-appliances that some definite schedule of service entrance-equipment is desirable for the guidance of contractors and wiremen. We are working this out with the idea of standardizing the service conduit, cut out, cabinet and wires for a given kilowatt load, either installed or on basis of capacity of circuits wired up. If the use of electricity is to made as reliable as gas we must see to it that the customer has capacity sufficient for his maximum demand, otherwise, the service will fall into disrepute.

Yours truly,

F. A. Cambridge,
City Electrician.

HYDRO NEWS ITEMS

Severn System

GENERAL—Work is progressing favorably on the construction of the transmission line from Barrie to Alliston and it is expected that the line will be completed as far as Cookstown by the end of January and ready for delivering power to the municipality of Alliston early in February. Work has already been started on erection of poles on the Beeton and Tottenham branch of this line. This section of transmission lines constitutes an extension of the Severn System south of Barrie to serve the municipalities in the southern part of Simcoe County and when completed will also include an extension to the town of Bradford.

ALLISTON—The construction department of the Commission have started work on the rebuilding of the Alliston distribution system and this municipality will probably be served with Hydro power from the Severn System during the month of February.

COLDWATER—The municipality of Coldwater has recently completed the construction of an extension to its local system to serve the Higginson stone quarry which supplies crushed limestone for the Sudbury smelters.

ELMVALE—The municipality of Elmvale has secured the load of the Copeland Flour Mills in its municipality which will increase the Elmvale power demand to the extent of 100 horsepower.

MIDLAND—The shipbuilding plant of the Midland Dry Dock Company is rapidly nearing completion and this company, inside of six months, expects to be taking 1,000 horsepower from the local Hydro System for the purpose of operating its plant. This load will practically double the present demand in the municipality of Midland and will be of great advantage to the town in general.

ORILLIA—The new Swift Rapids' development belonging to the municipality of Orillia was placed in operation during the latter part of the month of November and is now serving the town with the exception of a small amount of power which is being taken from the Wasdell's development. It is expected that the Orillia plant at Swift Rapids will be able to place in operation a third unit early in the month of January and that they will soon be able to deliver power to the Commission from the Swift Rapids' plant.

PENETANG—The municipality of Penetang has finally succeeded in securing the power load of the Copeland Flour Mills which will increase the town's demand to the extent of about 100 horsepower.

Eugenia System

GENERAL—Work is progressing favorably on the extension to the Eugenia development which includes the installation of a 4,000 h.p. unit and the extension to the power house to include additional transformer capacity and switching equipment. It is expected that the new unit will be in operation in about four or five months.

ARTHUR—The municipality has secured two additional power customers both of which intend to use power to operate flour and chopping mills. The power demand of the municipality will be increased by approximately 100 h.p. due to these additional loads.

CARLSRUHE AND NEUSTADT—The municipaliteis of Carlsruhe and Neustadt were connected to the Eugenia System in the early part of the month of December and are now being served through the Hanover substation.

EUGENIA VILLAGE—An additional customer has been secured at Eugenia Village, in the nature of a chopping mill and as the Flesherton feeder from the Eugenia development serving Artemesia Township and Flesherton Village has in the past been serving lighting customers only, this additional power load will tend to greatly improve the load factor on this feeder.

HANOVER—The municipality of Hanover was connected to the Eugenia System on November 15. The distribution system in the municipality is now being reconstructed by the Commission's construction department and it is expected that in the course of a few months, the municipality will be thoroughly equipped for taking care of any lighting or power customer desiring service.

SHELBURNE—The municipality has secured an additional power customer in the nature of the Hamilton Milling Company and the demand in this town is now double the previous demand, due to securing this load.

Niagara System

BARTON TOWNSHIP—The Barton Township Council is submitting a Hydro-Electric Enabling By-Law and a Hydro Money By-Law for $55,000 to the ratepayers at the coming municipal elections.

SANDWICH — The installation of one of the large rotary converters in the plant of the Sandwich Salt Company, has been completed, and a small block of off-peak power is now being supplied to this company. This power is being used for the manufacture of chemicals for war munitions.

STRATFORD—The work of building a new 26,000-volt sub-station at Stratford and installing the necessary equipment therein will be completed in three or four weeks, after which time all of the municipalities supplied from this station will receive their power at 26,400-volts instead of 13,200 volts as at present. This change will result in much better voltage regulation in the municipalities in this district.

HYDRO MUNICIPALITIES

NIAGARA SYSTEM

25 Cycles.

	Pop.
Acton	1,735
Ailsa Craig	586
Ayr	800
Baden	710
Beachville	503
Blenheim	1,424
Bolton	727
Bothwell	703
Brampton	4,041
Brantford	25,420
Breslau	500
Burford	700
Burgessville	300
Caledonia	1,217
Chatham	12,863
Clinton	2,177
Comber	800
Dashwood	350
Delaware	350
Dorchester	400
Dresden	1,521
Drumbo	400
Dublin	218
Dundas	4,652
Dutton	870
Elmira	2,270
Elora	1,115
Embro	483
Exeter	1,572
Fergus	1,776
Forest	1,495
Galt	11,852
Georgetown	1,905
Goderich	4,655
Grantham Township	3,271
Granton	300
Guelph	16,735
Hagersville	1,105
Hamilton	100,461
Harriston	1,404
Hensall	749
Hespeler	2,740
Highgate	500
Ingersoll	5,176
Kitchener	19,266
Lambeth	350
Listowel	2,326
London	58,055
Lucan	662
Lynden	662
Milton	2,072
Milverton	893
Mimico	1,976
Mitchell	1,687
Mount Brydges	500
New Hamburg	1,543
New Toronto	1,186
Niagara Falls	11,147
Norwich	1,189
Otterville	500
Palmerston	1,843
Paris	4,370
Petrolia	3,891
Plattsville	550
Point Edward	899
Port Credit	1,046
Port Dalhousie	1,318
Port Stanley	849
Preston	4,643
Princeton	600
Ridgetown	2,326
Rockwood	650
Rodney	655
Sandwich	3,077
Sarnia	11,676
Seaforth	1,964
Simcoe	4,061
Springfield	442
St. Catharines	17,880
St. George	600
St. Jacobs	400
St. Mary's	3,958
St. Thomas	17,174
Stamford Twp.	3,418
Stratford	17,081
Strathroy	2,998
Streetsville	539
Tavistock	1,009
Thamesford	504
Thamesville	769
Thorndale	250
Tilbury	1,740
Tillsonburg	3,084
Toronto	463,705
Toronto Twp.	4,875
Walkerville	5,096
Wallaceburg	4,107
Waterdown	785
Waterford	1,133
Waterloo	4,956
Watford	1,221
Welland	7,243
West Lorne	724
Wellesley	583
Weston	2,156
Windsor	24,162
Woodbridge	639
Woodstock	10,084
Wyoming	544
Zurich	450
Total	976,272

SEVERN SYSTEM

60 Cycles.

Barrie	6,453
Camp Borden	...
Coldwater	579
Collingwood	6,361
Creemore	585
Elmvale	775
Midland	6,258
Orillia	7,448
Penetang	3,928
Port McNicoll	500
Stayner	972
Victoria Harbor	1,477
Waubaushene	600
Total	35,936

WASDELL'S SYSTEM

60 Cycles.

Beaverton	1,015
Brechin	215
Cannington	903
Sunderland	570
Woodville	388
Total	3,091

ST. LAWRENCE SYSTEM.

60 Cycles.

Brockville	9,428
Chesterville	854
Prescott	2,740
Williamsburg	100
Winchester	1,065
Total	14,187

EUGENIA SYSTEM

60 Cycles.

	Pop.
Alton	700
Artemesia Twp.	...
Arthur	1,041
Chatsworth	374
Chesley	1,975
Dundalk	721
Durham	1,600
Elmwood	500
Flesherton	428
Grand Valley	644
Hanover	3,221
Holstein	285
Horning's Mills	350
Markdale	989
Mount Forest	1,941
Orangeville	2,493
Owen Sound	11,910
Shelburne	1,115
Tara	590
Total	30,877

OTTAWA SYSTEM.

60 Cycles.

Ottawa	100,163

PORT ARTHUR SYSTEM.

60 Cycles.

Port Arthur	14,307

MUSKOKA SYSTEM

60 Cycles.

Gravenhurst	1,702
Huntsville	2,395
Total	4,097

CENTRAL ONTARIO SYSTEM.

60 Cycles.

Belleville	12,277
Bowmanville	3,655
Brighton	1,337
Cobourg	4,712
Colborne	1,012
Deseronto	2,221
Kingston	21,325
Lindsay	7,481
Madoc	1,179
Millbrook	835
Napanee	2,926
Newburgh	486
Newcastle	611
Omemee	482
Orono	700
Oshawa	8,240
Peterboro	20,426
Port Hope	4,649
Stirling	732
Trenton	5,000
Tweed	1,364
Whitby	2,864
Total	104,514

NORTHERN SYSTEM.

60 Cycles.

Callander	650
Nipissing	400
North Bay	9,855
Powassan	575
Total	11,480

THE aim of the Bulletin is to provide municipalities with a source of information regarding the activities of the Commission; to provide a medium through which matters of common interest may be discussed, and to promote a spirit of cooperation between Hydro Municipalities.